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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Frank Hershkowitz

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EXAMINER

WARTALOWICZ, PAUL A

ART UNIT

PAPER NUMBER

1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/771,919	Applicant(s) HERSHKOWITZ ET AL.	
	Examiner PAUL A. WARTALOWICZ	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3,5 and 7-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3,5 and 7-17 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 3, 5, 7-17 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

Claim 13 is objected to because of the following informalities: the recitation in claim 13 of "at least a portion of the purge gas stream as the fuel in step (e)" is objected to. There does not appear to be a fuel used in step (e). It appears that this is a typographical error and "step (e)" should recite --step (f)--. Appropriate correction is required.

Applicant is advised that should claims 5 and 10 be found allowable, claim 5 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1793

The recitation in claim 7 of "introducing at least a portion as fuel" renders the claim indefinite. It is unclear what the phrase "a portion" is modifying. It appears that the portion referred to is absorbed components.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3, 5, 7-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz (US 2003/0235529) (reference US 60/391,360) in view of Cimini (US 5624964).

Hershkowitz teaches a process for producing synthesis gas [0010] comprising passing a feed stream under high pressure conditions, feeding hydrocarbon and steam [0010] through a first zone containing packing materials and a steam reforming catalyst at elevated temperatures [0010, 0017] to produce a high temperature synthesis gas stream [0031], passing at least a portion of the synthesis gas stream produced by the

Art Unit: 1793

reforming through the first end of a second zone containing bed packing materials [0019, 0017], thereby transferring sensible heat from the synthesis gas to the packing material in the second zone [0019, 0020] and providing a high pressure synthesis gas at a temperature approaching that of the packing material at the second end [0019], said reforming and cooling steps conducted at a space velocity of up to $1000,000 \text{ hr}^{-1}$ (overlaps with at least $1,000 \text{ hr}^{-1}$, [0053]), and a heat transfer parameter ΔT_{HT} between $0.1\text{-}500^\circ\text{C}$ [0052], and at conditions sufficient to provide a regeneratively cooled synthesis gas at said second end of said second zone in the range of $20\text{-}600^\circ\text{C}$ (overlaps with a range of $220\text{-}600^\circ\text{C}$, [0019]), and introducing a mixture of fuel and oxygen containing gas at a pressure lower than the reforming step [0023] (compare pressure of regeneration step 1-10 and pressure of reforming step 5-50, pressure of regeneration step is lower than the pressure of the reforming step for most values of the respective pressures, [0031]) for combusting substantially at the interface of the two zones and heating the first zone to reforming temperatures (meets the limitation of 'for combustion and passage through said second and first zone', [0010]) and creating flue gas that is equal in temperature to the inlet temperature of hydrocarbon at the reforming step (appears to meet the limitation of creating cooled flue gas as inlet temperature of hydrocarbon at the reforming step is $20\text{-}600^\circ\text{C}$, [0010, 0026]).

Regarding claims 10 and 11; Hershkowitz fails to teach passing the high pressure synthesis gas (produced by reforming step) through a high temperature water gas shift reaction and passing the hydrogen enriched stream produced therein through a hydrogen separation zone to produce high pressure hydrogen.

Cimini, however, teaches a hydrocarbon steam process (col. 1, lines 5-15) comprising subjecting synthesis gas to a high temperature water gas shift reaction and PSA swing absorber to produce a purified hydrogen product (col. 7, lines 25-52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to subject the synthesis gas of Hershkowitz to a high temperature water gas shift reaction and PSA swing absorber in order to produce a purified hydrogen product (col. 7, lines 25-52) as taught by Cimini.

Regarding claim 3, Hershkowitz teaches producing a flue gas that is equal in temperature to the inlet temperature of hydrocarbon at the reforming step (appears to meet the limitation of creating cooled flue gas as inlet temperature of hydrocarbon at the reforming step is 20-600°C, [0010, 0026]).

Regarding claim 5, Hershkowitz teaches a regeneratively cooled synthesis gas at said second end of said second zone in the range of 20-600°C (overlaps with a range of 220-600°C, [0019]). In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. MPEP 2144.05.

Regarding claims 7 and 13, Hershkowitz fails to teach recovering absorbed components from the pressure swing reformer and introducing at least a portion as fuel into the pressure swing reformer during the regeneration cycle.

Hershkowitz, however, teaches that the feed for the regeneration step includes methane and carbon monoxide [0028].

Art Unit: 1793

Cimini, however, teaches using by-products (including methane and carbon monoxide) from the PSA in the combustion/regeneration to produce heat for the process (col. 7, lines 50-65).

As Hershkowitz teaches that the feed for the regeneration step includes methane and carbon monoxide [0028] and Cimini teaches using by-products (including methane and carbon monoxide) from the PSA in the combustion/regeneration to produce heat for the process (col. 7, lines 50-65), it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide recycling by products from the PSA adsorber to the regeneration cycle of Hershkowitz in order to provide a source of carbon monoxide and methane to the regeneration cycle.

Regarding claim 8, Hershkowitz teaches that flue gas is used during the regeneration step [0021]. While not explicitly stating that the flue gas used in the regeneration step is flue gas produced in the combustion during the regeneration step, one of ordinary skill would recognize that recycling the flue gas produced would be efficient and achieved through routine implementation.

Regarding claims 9 and 16, Hershkowitz fails to teach that the oxygen containing gas of the regeneration is provided as compressed air from a gas turbine.

Cimini, however, teaches using compressed air from a gas turbine in the regenerator/combustor for the purpose of providing a heat sink to moderate the combustion exotherm (col. 3, line 60-col. 4, line 15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide using compressed air from a gas turbine

Art Unit: 1793

in the regeneration cycle of Hershkowitz in order to provide a heat sink to moderate the combustion exotherm (col. 3, line 60-col. 4, line 15) as taught by Cimini.

Regarding claim 12, Hershkowitz teaches pressure of reforming step 5-50 [0031].

Regarding claims 14 and 15, Hershkowitz teaches that the heat from the flue gas is heat exchanged against the incoming oxygen-containing stream [0043]. While not explicitly stating that the heat of the flue gas is used to produce steam, it appears that the heat of the flue gas can be used to heat whatever components are necessary for the process. Therefore, it would have been obvious to one of ordinary skill in the art at the time applicants' invention was made to use the heat of the flue to provide steam because the heat of the flue gas can be used to heat whatever components are necessary for the process in the absence of a showing to the contrary.

Additionally, Hershkowitz teaches that flue gas is used during the regeneration step [0021]. While not explicitly stating that the flue gas used in the regeneration step is flue gas produced in the combustion during the regeneration step, one of ordinary skill would recognize that recycling the flue gas produced would be efficient and achieved through routine implementation.

Regarding claim 17, Hershkowitz teaches that the packing material of the first and second zones is composed of alumina, inter alia [0056].

Claims 8, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkowitz (US 2003/0235529) (reference US 60/391,360) in view of Cimini (US 5624964) in view of Lywood (US 5030661).

Hershkowitz teaches a process as described above in claim 10.

Hershkowitz fails to teach passing the flue gas through a heat exchanger to form steam for the reforming step.

Hershkowitz, however, does teach that the flue gas is equal in temperature to the inlet temperature of hydrocarbon at the reforming step (appears to meet the limitation of creating cooled flue gas as inlet temperature of hydrocarbon at the reforming step is 20-600°C, [0010, 0026]).

Lywood, however, teaches a method of making hydrogen (col. 1, lines 4-10) and that it is known to use the heat from a flue gas to produce steam (col. 10-25).

As Hershowitz teaches that the flue gas is equal in temperature to the inlet temperature of hydrocarbon at the reforming step (appears to meet the limitation of creating cooled flue gas as inlet temperature of hydrocarbon at the reforming step is 20-600°C, [0010, 0026]) and Lywood teaches that it is known to use the heat from a flue gas to produce steam (col. 10-25), it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to produce steam via heat exchange using the heat of the flue gas in Hershowitz as it is known in the art to do so as taught by Lywood and because Hershowitz teaches that the flue gas produced is hot.

Regarding claims 8 and 15, Hershkowitz teaches that flue gas is used during the regeneration step [0021]. While not explicitly stating that the flue gas used in the regeneration step is flue gas produced in the combustion during the regeneration step, one of ordinary skill would recognize that recycling the flue gas produced would be efficient and achieved through routine implementation.

Art Unit: 1793

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. WARTALOWICZ whose telephone number is (571)272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
July 17, 2010

/Stanley Silverman/
Supervisory Patent Examiner, AU 1793